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(54) PLASMA DISPLAY PANEL

(57)Abstract:
PROBLEM TO BE SOLVED: To eliminate erroneous discharging and stabilize the control of image display by uniformizing the charge quantity accumulated on a phosphor film surface in the discharge by applying an AC voltage between electrodes and using the charge accumulated on a dielectric body.
SOLUTION: As the phosphor that is the main component of the paste used for phosphor film formation, [Y,Gd]BO3: Eu as red phosphor, Zn2SiO4:Mn as green phosphor, and BaMgAl10O17: Eu as blue phosphor are used. When SiO2 powder for accumulating negative charges on the particle surface is mixed to the red phosphor for accumulating positive charges thereon, the charge quantity to be accumulated on the red phosphor film surface is set equal to that on the green phosphor film or blue phosphor film, whereby the operating margin range can be equalized to that of the green phosphor film or blue phosphor film. Further, Y2O3: Eu as red phosphor, BaAl12O19: Mn or (Ba,Sr,Mg)O.aA12O3 as green phosphor may be used.

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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] Each cel is equipped with the 1st and 2nd electrodes covered with the dielectric, and the 3rd electrode covered by the fluorescent screen. As opposed to the plasma display which has arranged in matrix the cel which emits light in a predetermined color In the plasma display panel which is made to accumulate a charge on the dielectric of said 1st and 2nd electrodes, impresses alternating voltage to inter-electrode [said / 1st and 2nd], is made to discharge using the charge accumulated on said dielectric, and performs image display Said fluorescent screen is a plasma display panel characterized by the amount of charges to accumulate being uniform.
[Claim 2] Said fluorescent screen is a plasma display panel according to claim 1 characterized by the amount of charges accumulated in a film front face forming by a uniform red fluorescent screen and a uniform green fluorescent screen, and the blue fluorescent screen.
[Claim 3] Said fluorescent screen is a plasma display panel according to claim 2 characterized by including the oxide with which said borate fluorescent substance or a yttrium oxide fluorescent substance is electrified in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.
[Claim 4] Said fluorescent screen is a plasma display panel according to claim 2 characterized by covering the oxide which wears a negative charge on the particle front face of said borate fluorescent substance or a yttrium oxide fluorescent substance in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.
[Claim 5] Said oxide is SiO2, V2O5, MoO3 and Ta 2O5, Nb2O3, TiO2, SnO2, GeO2 and Fe 2O3, Fe3O4, and a plasma display panel according to claim 2 to 4 characterized by being at least one or more kinds in B-2s As [O3 and] 2O3.
[Claim 6] Said fluorescent screen is a plasma display panel according to claim 2 characterized by including the oxide which wears positive charge on said silicate fluorescent substance, a phosphate fluorescent substance, or the aluminate fluorescent substances in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.
[Claim 7] Said fluorescent screen is a plasma display panel according to claim 2 characterized by covering the oxide which wears positive charge on the particle front face of either said silicate fluorescent substance, a phosphate fluorescent substance or an aluminate fluorescent substance in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent substance film formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.
[Claim 8] Said oxide MgO, ZnO, PbO, Eu 2O3, Nd2O3, TmO3 and Dy 2O3, Y2O3, La2O3, A12O3, T12O3, In2O3, Bi2O3, HfO2, CoO, The plasma display panel according to claim 2, 6, or 7 characterized by being at least one or more kinds in CuO, NiO, Ga 2O3, and MnO2, CeO2, CnO3 and Sc 2O3.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to an alternating current mold plasma display panel (AC mold plasma display panel is called hereafter) and the fluorescent screen especially prepared in AC mold plasma display panel of a field discharge mold.
[0002]
[Description of the Prior Art] by irradiating the fluorescent substance which emits light in a specific color, and carrying out excitation luminescence of the ultraviolet rays generated in the discharge in gases, AC mold plasma display panel forms color display (multiple color -- and full color). Hereafter, an example is given and AC mold plasma display panel is explained. The plasma display panel is variously studied as thin television or a thin display monitor between the glass plates of two sheets as everyone knows with the structure which made the very small discharge cel (pixel), and AC mold plasma display panel which has a memory function in one of them is known. There is a field discharge mold as one of the AC molds. Drawing 1 is the perspective view showing the structure of AC mold plasma display panel of a field discharge mold, and AC mold plasma display panel of such structure is shown in JP,7-140922,A, JP,7-287548,A, or Japan display'92. In drawing, the glass front substrate whose 1 is a field discharge mold plasma display panel and whose 2 is the screen, and 3 are the tooth-back glass substrates by which opposite arrangement was carried out across the glass front substrate 2 and discharge space. The dielectric layer with which the 1st line electrode X formed so that 4 and 5 might become a pair mutually on a glass front substrate and the 2nd line electrode Y, and 6 were covered on these line electrode, and 7 are MgO(s) (magnesium oxide) formed by approaches, such as vacuum evaporationo, on the dielectric layer. The fluorescent substance layer which the train electrode W formed as crossed at right angles in a line electrode and 8 on a tooth-back glass substrate, and 9 are the fluorescent substance layers formed on the train electrode, and emits light in red, green, and blue for every train electrode, respectively is prepared in the shape of a stripe in good order. 10 is the septum formed in each train inter-electrode, and a septum also has the role of the stanchion the plasma display other than the role which separates a discharge cel is made not to be crushed with atmospheric pressure. The gas for discharge, such as Ne-Xe mixed gas and helium-Xe mixed gas, is enclosed with the space between glass substrates below with atmospheric pressure, and the discharge cel of the intersection of the train electrode which intersects perpendicularly with the line electrode which serves as a pair mutually serves as a pixel. Hereafter, X electrode and the 2nd line electrode are called Y electrode, and a train electrode is called W electrode for the 1st line electrode.
[0003] Processing aiming at improvement in an ion bombardment-proof property is conventionally performed to the particle front face of the fluorescent substance used for the fluorescent screen of a plasma display panel. As described as a conventional example at JP,52-22579,A Zn2SiO4:Mn, As opposed to fluorescent substances, such as Y2SiO6:Ce, YVO4:Eu, and ZnO:Zn The thing which makes a fluorescent substance front face carry out electrostatic adsorption of oxides, such as SiO2, aluminum2O3, and MgO, or the fluoride of MgF2, CaF2, and BaF2 grade, As a red fluorescent substance as described at JP,52-1556188,A Y2O3:Eu or Gd2O3:Eu, Zn2SiO4:Mn is used as a green fluorescent substance, CaWO4:Ce or Y2SiO5:Ce is used as a blue fluorescent substance, and there are some which the fluoride of LiF, NaF, KF, MgF2, CaF2, and SrF2 grade is made to stick to a fluorescent substance particle front face to these, and protect a fluorescent substance.
[0004]
[Problem(s) to be Solved by the Invention] Drawing 3 shows red when it considers as a scanning electrical potential difference at an axis of abscissa and it considers as sustaining voltage at an axis of ordinate, green, and the margin (difference of starting potential and sustaining voltage) of a blue cel of operation. Control of discharge is performed

with a certain specific electrical-potential-difference value of margin within the limits with which each cel shown according to the mesh line of drawing laps, and is controlling by scanning electrical-potential-difference-170V and sustaining voltage 170V in the actual product. All over the operating point, a call, and drawing, the double circle shows this control voltage. Since the margin electrical potential difference of a red cel of operation had the margin range lower than other colors, even if there was no electrical-potential-difference impression to W electrode, the discharge in which discharge occurs tended to happen and it had become the yield of a panel, and the cause of lowering of image quality. Furthermore, there was an inclination for breakdown voltage to fall with time by the repeat of discharge of the cel of each color, and for a margin of operation to become narrow, and there was a trouble of degradation with time to which a margin of operation is less than the operating point, and it becomes impossible to carry out controlling the discharge in a red cel with the lowest breakdown voltage among three colors.

[0005] In AC mold plasma display panel, when a phosphor screen is formed in a particle front face using the fluorescent substance which has processed nothing, a charge accumulates the fluorescent substance particle front face of the fluorescent screen exposed to discharge space. For example, a negative charge is accumulated in the blue fluorescent screen front face formed by the green fluorescent screen formed from Zn2SiO4:Mn, and BaMgAl10O17:Eu, and positive charge is accumulated in the red fluorescent screen front face formed by BO(Y, Gd) 3:Eu. Since are recording of a charge has big effect on the breakdown voltage of AC mold plasma display panel, in order to perform stable controlling the discharge, it is desirable that the amount of charges accumulated in a fluorescent screen front face is uniform.

[0006] Therefore, disabling of controlling the discharge from which the unevenness of the amount of charges accumulated in the fluorescent substance particle front face of the fluorescent screen of each color happens by fluctuation of the discharge mentioned above or a margin [with time] of operation was made easy to cause.

[0007] Protection from an ion bombardment is a key objective, and the surface treatment of the fluorescent substance used for the phosphor screen of a panel conventionally currently described at JP,52-22579,A and JP,52-156188,A is making the protective material common to each of each color fluorescent substance cover. Therefore, since equalization of the amount of charges accumulated in each fluorescent substance particle at the time of being exposed to discharge space is not taken into consideration, said problem is unsolvable.

[0008] Made in order that this invention might solve the above troubles, the 1st object loses the discharge in red and green, and a blue cel, and carries out control of image display to stability.

[0009] Furthermore, the 2nd object loses discharge by making equivalent early red, green, and the margin range of a blue cel, when the starting potential lowering with time which takes place by the repeat of discharge occurs.

[0010]

[Means for Solving the Problem] AC mold plasma display panel in connection with this invention Each cel is equipped with the 1st and 2nd electrodes covered with the dielectric, and the 3rd electrode covered by the fluorescent screen. To the plasma display which has arranged in matrix the cel which emits light in a predetermined color, store up a charge on the dielectric of said 1st and 2nd electrodes, impress alternating voltage to inter-electrode [said / 1st and 2nd], it is made to discharge using the charge accumulated on said dielectric, and image display is performed.

[0011] In order to solve a technical problem, the fluorescent screen of the 1st invention is characterized by making into homogeneity the amount of charges accumulated in a film front face.

[0012] Moreover, the fluorescent screen of the 2nd invention is characterized by forming by the red fluorescent screen from which the amount of charges accumulated in a film front face in said 1st invention becomes uniform and the green fluorescent screen, and the blue fluorescent screen.

[0013] Moreover, the fluorescent screen of the 3rd invention is characterized by including the oxide with which said borate fluorescent substance or a yttrium oxide fluorescent substance is electrified in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance in said 2nd invention, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.

[0014] Moreover, the fluorescent screen of the 4th invention is characterized by covering the oxide which wears a negative charge on the particle front face of said borate fluorescent substance or a yttrium oxide fluorescent substance in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance in said 2nd invention, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.

[0015] Moreover, 5th invention is characterized by said oxide being at least one or more kinds in SiO2, V2O5, MoO3 and Ta 2O5, Nb2O3, TiO2, SnO2, GeO2 and Fe 2O3, Fe3O4, and B-2s As [O3 and] 2O3 in said 2-4th invention.

[0016] Moreover, the fluorescent screen of the 6th invention is characterized by including the oxide which wears

positive charge on said silicate fluorescent substance, a phosphate fluorescent substance, or the aluminate fluorescent substances in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance in said 2nd invention, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.

[0017] Moreover, the fluorescent screen of the 7th invention is characterized by carrying out the surface coat of the oxide which wears positive charge on the particle front face of either said silicate fluorescent substance, a phosphate fluorescent substance or an aluminate fluorescent substance in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance in said 2nd invention, and the fluorescent substance film formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance.

[0018] The 8th invention is set to invention of said 2nd [the], and 6 or 7. Said oxide Moreover, MgO, ZnO, PbO, Eu 2O3, Nd2O3, TmO3 and Dy 2O3, Y2O3, La2O3, aluminum2O3, Tl2O3, In2O3, Bi2O3, HfO2, CoO, It is characterized by being at least one or more of CuO, NiO, Ga 2O3, MnO2, CeO2 and Cr 2O3, and Sc2O3 kinds.

[0019]

[Embodiment of the Invention] Gestalt 1 drawing 1 of operation is the enclosure in which an example of the gestalt of implementation of this invention is shown, and is the perspective view of the cel of AC mold panel. The glass front substrate whose 1 is the cel of AC mold panel and whose 2 is the screen in drawing, The tooth-back glass substrate with which opposite arrangement of 3 was carried out across the glass front substrate 2 and discharge space, The 1st and the 2nd line electrode Xi and Yi with which 4 and 5 have been arranged on a glass front substrate, The dielectric layer by which 6 was formed on these line electrode, MgO by which 7 was formed on the dielectric layer, the train electrode W prepared as crossed at right angles in the line electrodes X and Y and 8 on a tooth-back glass substrate, and 9 are the fluorescent substance layers formed on the train electrode. The gas for discharge, such as Ne-Xe mixed gas or helium-Xe mixed gas, is enclosed with the discharge space between the glass front substrate 2 and the tooth-back glass substrate 3.

[0020] Drawing 2 is the voltage waveform which shows the actuation approach which is one example of this invention, and a voltage waveform is a voltage waveform impressed to the train electrode W, the 2nd line electrode Y, and the 1st line electrode X sequentially from a top in drawing. The maintenance pulse to which Sp carries out maintenance discharge, the scanning pulse for a scan in Scp, and Ap are address pulses impressed according to the content of an indicative data. In the actual product, before and behind 170V, the scanning pulse Scp is set up before and after -170V, and the address pulse Ap is set up for the maintenance pulse Sp before and after 60V.

[0021] Next, the formation approach of a fluorescent screen is explained. The fluorescent screen of a plasma display is formed of thick film printing. The main components of the paste for printing used for fluorescent screen formation are a fluorescent substance, cellulosic resin, butyl carbitol, acetyl butyl carbitol, etc., and each concentration is 45.26wt% 8.06wt% 8.68wt% 38wt(s)%. It prints, after adjusting this fluorescent substance paste to viscosity 40 - 60 Pa-S, and after making it dry at 150-200 degrees C for 1 hour, in atmospheric air, it calcinates for 30 minutes at 480 degrees C, an organic component is removed, and a fluorescent screen is obtained. Zn2SiO4:Mn is used for [Y, Gd] BO3:Eu and a green fluorescent substance, and BaMgAl10O17:Eu is used for a blue fluorescent substance at a red fluorescent substance.

[0022] In addition, with the gestalt of this operation, BaAl12O19:Mn and O-aAl(Ba, Sr, Mg) 2O3:Mn may be instead used for a red fluorescent substance at Y2O3:Eu and a green fluorescent substance.

[0023] Since the front face of the fluorescent screen formed of the fluorescent substance particle which is a high resistor is exposed to discharge space, it will be in an electrification condition. A table 1 shows the amount of electrifications accumulated in the particle front face of various kinds of fluorescent substances containing what is used for the fluorescent screen of the plasma display panel which is the gestalt of 1 implementation of this invention, and is the Toshiba Chemical CORP. make in measurement. The amount measuring device of blowing off fine-particles electrifications (MODELTB-200) was used. The amounts of charges which accumulate the fluorescent substance which constitutes the fluorescent screen of each color since presentations differ differ. This charge affects breakdown voltage, in order to accumulate W electrode in a wrap fluorescent screen front face. Although the result in which a red fluorescent substance just tends to be charged was shown in the fluorescent substance used with the gestalt of this operation, it is thought that a borate and a yttrium oxide fluorescent substance will just tend to be charged if its attention is paid to a presentation, and silicate, phosphate, or an aluminate fluorescent substance tends to be charged in negative. However, the aluminate of magnesium is just charged, and if MgO is independent, the relation of being just easy to be charged is guessed.

[0024]

[A table 1]

表 1

	組 成	帯電量(μC/G)
赤色蛍光体	(Y, Gd)BO_3:Eu	+0.074
	Y_2O_3:Eu	+0.106
緑色蛍光体	Zn_2SiO_4:Mn	−0.289
	$BaAl_{12}O_{19}$:Mn	−0.210
	(Ba, Sr, Mg)O・aAl_2O_3:Mn	−0.105
	$LaPO_4$:Ce, Tb	−0.042
	$MgAl_{11}O_{19}$:Tb, Mn	+0.051
	$MgAl_2O_4$:Mn	+0.550
青色蛍光体	$BaMgAl_{10}O_{17}$:Eu	−0.265

[0025] A table 2 shows the count of generating of the discharge at the time of switching on the light repeatedly according to the red constituted from a fluorescent substance indicated to a table 1, green, and the actuation conditions of the gestalt of this operation of the panel which consists of a blue fluorescent screen, and it turns out that discharge tends to happen about the electrified fluorescent substance. The count of generating of discharge is a count of the inside which performed burning 100 times, and makes [many] what generated discharge 10 times or more while of 100 times. Moreover, it measured by preparing sufficient interval so that there might be no effect of the remaining heat by the charge and discharge in which it remains in a cel for every measurement.

[0026]

[A table 2]

表 2

	組 成	誤放電の発生回数
赤色蛍光体	(Y, Gd)BO_3:Eu	多い
	Y_2O_3:Eu	多い
緑色蛍光体	Zn_2SiO_4:Mn	少ない
	$BaAl_{12}O_{19}$:Mn	少ない
	(Ba, Sr, Mg)O・aAl_2O_3:Mn	少ない
	$LaPO_4$:Ce, Tb	少ない
	$MgAl_{11}O_{19}$:Tb, Mn	多い
	$MgAl_2O_4$:Mn	多い
青色蛍光体	$BaMgAl_{10}O_{17}$:Eu	少ない

[0027] Next, the mechanism of discharge generating is explained. Drawing 3 is the cel sectional view showing the condition of the charge accumulated into the cel of the plasma display panel which is one example of this invention. In order to make the discharge in a cel start, it is required to impress an electrical potential difference to W electrode and Y electrode, and to produce the potential difference beyond 220V between two electrodes. However, the potential difference between two electrodes is changed with the amount of charges accumulated on the surface of a phosphor screen. For example, since the potential difference beyond 220V occurs in spite of not impressing the electrical potential difference to W electrode, when positive charge is accumulated like a red fluorescent screen, as shown in drawing 3 , discharge will occur. Therefore, even if there is no impression to W electrode into the red cel of the color plasma display which used [Y, Gd] BO3:Eu for the red fluorescent substance, it is easy to generate the discharge to which discharge takes place.

[0028] Therefore, in order to reduce generating of the discharge which is one factor of image quality degradation, it is very effective to make into homogeneity the amount of charges accumulated in the fluorescent screen front face of each color.

[0029] Next, how to make homogeneity the amount of charges accumulated in each fluorescent screen front face is explained. A table 3 shows the margin of operation at the time of making the color plasma display which Zn2SiO4:Mn was used for [Y, Gd] BO3:Eu and green fluorescent substance powder, it used BaMgAl10O17:Eu for blue fluorescent substance powder at red fluorescent substance powder, and was produced turn on on the actuation conditions of the gestalt of operation. At this time, it measured similarly about the case where SiO2 powder which accumulates a negative charge in a particle front face is mixed in a red fluorescent screen about the red fluorescent substance which positive charge accumulates. Consequently, the cel of the red fluorescent screen which does not mix SiO2 powder

became the margin range where the margin electrical-potential-difference range is equivalent to a blue fluorescent screen or a green fluorescent screen when SiO2 powder is mixed on the other hand although it becomes low from the cel of a blue fluorescent screen or a green fluorescent screen.

[0030] Therefore, since the amount of charges accumulated in a red fluorescent screen front face by mixing the oxide which wears right **** on a negative charge into the red fluorescent screen which is easy to be charged was able to be made equivalent to a green fluorescent screen or a blue fluorescent screen and the margin range of operation made it by this equivalent to a green fluorescent screen or a blue fluorescent screen, the probability of occurrence of discharge was able to be decreased substantially.

[0031]

[A table 3]

表 3

	Gセル	Bセル	Rセル	Rセル (酸化物混合)
帯電量(μC/g)	−0. 289	−0. 265	+0. 074	−0. 248
動作マージン(V)	156~193	155~196	138~181	149~194

[0032] A table 4 shows the count of generating of the discharge in the actuation conditions of the polarity of the charge accumulated when mixing various oxides into the red fluorescent substance film, and the gestalt of this operation in the red cel of the panel produced using this fluorescent substance particle. Although the oxides electrified in addition to SiO2 are V2O5, MoO3 and Ta 2O5, Nb2O3, TiO2, SnO2, GeO2 and Fe 2O3, Fe3O4, and B-2s As [O3 and] 2O3 and SiO2 was used in above-mentioned measurement The same effectiveness was acquired even if it used V2O5, MoO3 and Ta 2O5, Nb2O3, TiO2, SnO2, GeO2 and Fe 2O3, Fe3O4, and B-2s As [O3 and] 2O3.

[0033] Therefore, the amount of charges accumulated in a red fluorescent screen front face can be made equivalent to blue and a green fluorescent screen by using at least one or more kinds in the oxide whose amount of charges accumulated in the particle front face mentioned above is negative.

[0034] Moreover, with the gestalt of this operation, in order to make the amount of charges into homogeneity, it made to mix an oxide in a red fluorescent screen into the means, but the same effectiveness was acquired even if it made the whole red fluorescent substance particle front face or a part cover an oxide.

[0035] In addition, in the red fluorescent substance particle front face, even if it used any of vacuum deposition, such as an electrostatic adsorption process or a cathode sputtering and vacuum deposition, vapor growth, and a CVD method, about the coat approach of a wrap oxide, the same effectiveness was acquired.

[0036]

[A table 4]

表 4

酸化物組成	蓄電電荷の極性	実施の形態1の駆動条件における誤放電の発生回数
SiO_2	−	少ない
V_2O_5	−	少ない
MoO_3	−	少ない
MgO	+	多い
Ta_2O_5	−	少ない
ZnO	+	多い
PbO	+	多い
Eu_2O_3	+	多い
Nb_2O_3	−	少ない
TiO_2	−	少ない
Nd_2O_3	+	多い
SnO_2	−	少ない
Tm_2O_3	+	多い
Dy_2O_3	+	多い
Y_2O_3	+	多い
GeO_2	−	少ない
Fe_2O_3	−	少ない
La_2O_3	+	多い
Ga_2O_3	+	多い
MnO_2	+	多い
Fe_3O_4	−	少ない
B_2O_3	−	少ない
As_2O_3	−	少ない
Al_2O_3	+	多い
Tl_2O_3	+	多い
In_2O_3	+	多い
Bi_2O_3	+	多い
HfO_2	+	多い
CoO	+	多い
CuO	+	多い
NiO	+	多い
CeO_2	+	多い
Cr_2O_3	+	多い
Sc_2O_3	+	多い

[0037] The gestalt of two gestalten operation of operation explains the option for making into homogeneity the amount of charges which red, green, and a blue fluorescent screen front face accumulate in the gestalt 1 of operation in the color plasma display of the same structure as the panel of a publication. A table 5 shows the margin of operation at the time of making the panel which Zn2SiO4:Mn was used for [Y, Gd] BO3:Eu and a green fluorescent substance, it used BaMgAl10O17:Eu for the blue fluorescent substance at the red fluorescent substance, and was produced turn on on the actuation conditions of the gestalt of this operation. Moreover, it measured similarly about the case where the MgO powder which positive charge accumulates in a fluorescent substance particle front face is mixed in a fluorescent screen about the blue and the green fluorescent screen which a negative charge accumulates. Consequently, the cel of the blue which mixed MgO powder, and a green fluorescent screen fell to the margin range equivalent to the cel of a red fluorescent screen.

[0038] Therefore, since the range of a margin of operation was made equivalent to the cel of a red fluorescent screen by mixing the oxide electrified into the blue which is easy to charge a negative charge, and a green fluorescent screen, generating of discharge was able to be reduced substantially.

[0039] Moreover, since the operating point can be low set up if the margin range becomes low, low electrification is attained.

[0040]

[A table 5]

表 5

	Gセル	Bセル	Rセル	Gセル (酸化物混合)	Bセル (酸化物混合)
帯電量 (μC/g)	+0. 074	−0. 289	−0. 265	+0. 102	+0. 088
動作マージン (V)	138~181	156~193	155~196	140~184	138~182

[0041] The count of generating of the discharge in the actuation conditions of the polarity of the charge accumulated in the particle front face of various oxides and the gestalt of this operation is shown in a table 6. The oxide electrified in addition to MgO ZnO, PbO, Eu 2O3, Nd2O3, TmO3 and Dy 2O3, Y2O3, La2O3, aluminum2O3, Tl2O3, In2O3, Bi2O3, HfO2, CoO, Although it is CuO, NiO, Ga 2O3, MnO2, CeO2 and Cr 2O3, and Sc2O3 and MgO was used in above-mentioned measurement ZnO, PbO, Eu 2O3, Nd2O3, TmO3 and Dy 2O3, Y2O3, La2O3, aluminum2O3, Tl2O3, In2O3, Bi2O3, HfO2, CoO, The same effectiveness was acquired even if it used CuO, NiO, Ga 2O3, MnO2, CeO2 and Cr 2O3, and Sc2O3.

[0042]

[A table 6]

表 6

酸化物組成	蓄電電荷の極性	実施の形態2の駆動条件における誤放電の発生回数
SiO_2	−	多い
V_2O_5	−	多い
MoO_3	−	多い
MgO	+	少ない
Ta_2O_5	−	多い
ZnO	+	少ない
PbO	+	少ない
Eu_2O_3	+	少ない
Nb_2O_3	−	多い
TiO_2	−	多い
Nd_2O_3	+	少ない
SnO_2	−	多い
Tm_2O_3	+	少ない
Dy_2O_3	+	少ない
Y_2O_3	+	少ない
GeO_2	−	多い
Fe_2O_3	−	多い
La_2O_3	+	少ない
Ga_2O_3	+	少ない
MnO_2	+	少ない
Fe_3O_4	−	多い
B_2O_3	−	多い
As_2O_3	−	多い
Al_2O_3	+	少ない
Tl_2O_3	+	少ない
In_2O_3	+	少ない
Bi_2O_3	+	少ない
HfO_2	+	少ない
CoO	+	少ない
CuO	+	少ない
NiO	+	少ない
CeO_2	+	少ない
Cr_2O_3	+	少ない
Sc_2O_3	+	少ない

[0043] Therefore, the amount of charges accumulated in blue and a green fluorescent screen front face can be made equivalent to a red fluorescent screen by using at least one or more kinds in the oxide whose amount of charges

accumulated in the particle front face mentioned above is forward.
[0044] Moreover, with the gestalt of this operation, in order to make the amount of electrifications into homogeneity, it made to mix an oxide in blue and a green fluorescent screen into the means, but the same effectiveness was acquired even if it made blue and the whole green fluorescent substance particle front face, or a part cover an oxide.
[0045] In addition, in blue and a green fluorescent substance particle front face, even if the coat approach of a wrap oxide used any of vacuum deposition, such as an electrostatic adsorption process or a cathode sputtering and vacuum deposition, vapor growth, and a CVD method, the same effectiveness was acquired.
[0046] The same is said of the plasma display of the multiscreen application arranged in [although the color plasma display which is the gestalt 3 of operation, and which used the blue fluorescent substance, green fluorescent substance, and red fluorescent substance with the gestalten 1 and 2 of operation was described, the cel which emits light in the monochrome by the combination of a blue fluorescent substance, a red fluorescent substance, or a green fluorescent substance and a red fluorescent substance consists of two colors, and] matrix.
[0047]
[Effect of the Invention] As mentioned above, according to the plasma display panel in connection with claim 1 of this invention Each cel is equipped with the 1st and 2nd electrodes covered with the dielectric, and the 3rd electrode covered by the fluorescent screen. As opposed to the plasma display which has arranged in matrix the cel which emits light in a predetermined color In the plasma display panel which is made to accumulate a charge on the dielectric of said 1st and 2nd electrodes, impresses alternating voltage to inter-electrode [said / 1st and 2nd], is made to discharge using the charge accumulated on said dielectric, and performs image display Since the amount of charges which said fluorescent screen accumulates is made into homogeneity, the stable actuation is attained and good image display can be performed.
[0048] Since the amount of charges which accumulates said fluorescent screen in a film front face formed by a uniform red fluorescent screen and a uniform green fluorescent screen, and the blue fluorescent screen according to the plasma display panel in connection with claim 2 of this invention, the stable actuation is attained and good image display can be performed.
[0049] Since the oxide with which said borate fluorescent substance or a yttrium oxide fluorescent substance is electrified is included in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance according to the plasma display panel in connection with claim 3 of this invention, the stable actuation is attained and good image display can be performed.
[0050] According to the plasma display panel in connection with claim 4 of this invention, in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance, since the oxide which wears a negative charge on the particle front face of said borate fluorescent substance or a yttrium oxide fluorescent substance was covered, the stable actuation is attained and said fluorescent screen can perform good image display.
[0051] According to the plasma display panel in connection with claim 5 of this invention, since it is at least one or more kinds in SiO2, V2O5, MoO3 and Ta 2O5, Nb2O3, TiO2, SnO2, GeO2 and Fe 2O3, Fe3O4, and B-2s As [O3 and] 2O3, the stable actuation is attained and said oxide can perform good image display.
[0052] According to the plasma display panel in connection with claim 6 of this invention, in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent screen formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance, since the oxide which wears positive charge on said silicate fluorescent substance, a phosphate fluorescent substance, or the aluminate fluorescent substances is included, the stable actuation is attained and said fluorescent screen can perform good image display.
[0053] According to the plasma display panel in connection with claim 7 of this invention, in the fluorescent screen formed with a borate fluorescent substance or a yttrium oxide fluorescent substance, and the fluorescent substance film formed of at least one sort in a silicate fluorescent substance, a phosphate fluorescent substance, or an aluminate fluorescent substance, since the oxide which wears positive charge on the particle front face of either said silicate fluorescent substance, a phosphate fluorescent substance or an aluminate fluorescent substance was covered, the stable actuation is attained and said fluorescent screen can perform good image display.
[0054] According to the plasma display panel in connection with claim 8 of this invention Said oxide MgO, ZnO, PbO, Eu 2O3, Nd2O3, TmO3 and Dy 2O3, Y2O3, La2O3, A12O3, T12O3, In2O3, Bi2O3, HfO2, CoO, Since it is at least one or more kinds in CuO, NiO, Ga 2O3, and MnO2, CeO2, CnO3 and Sc 2O3, the stable actuation is attained and

good image display can be performed.

[Translation done.]